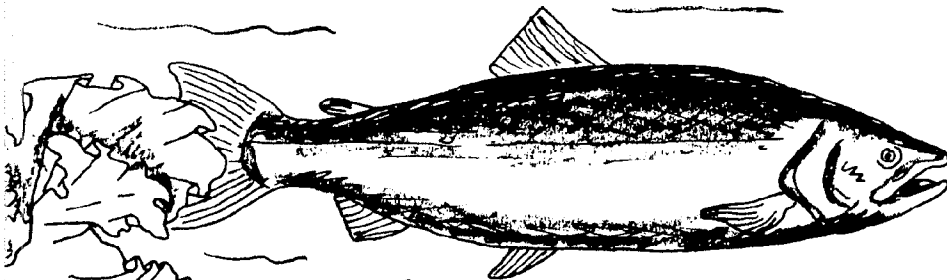
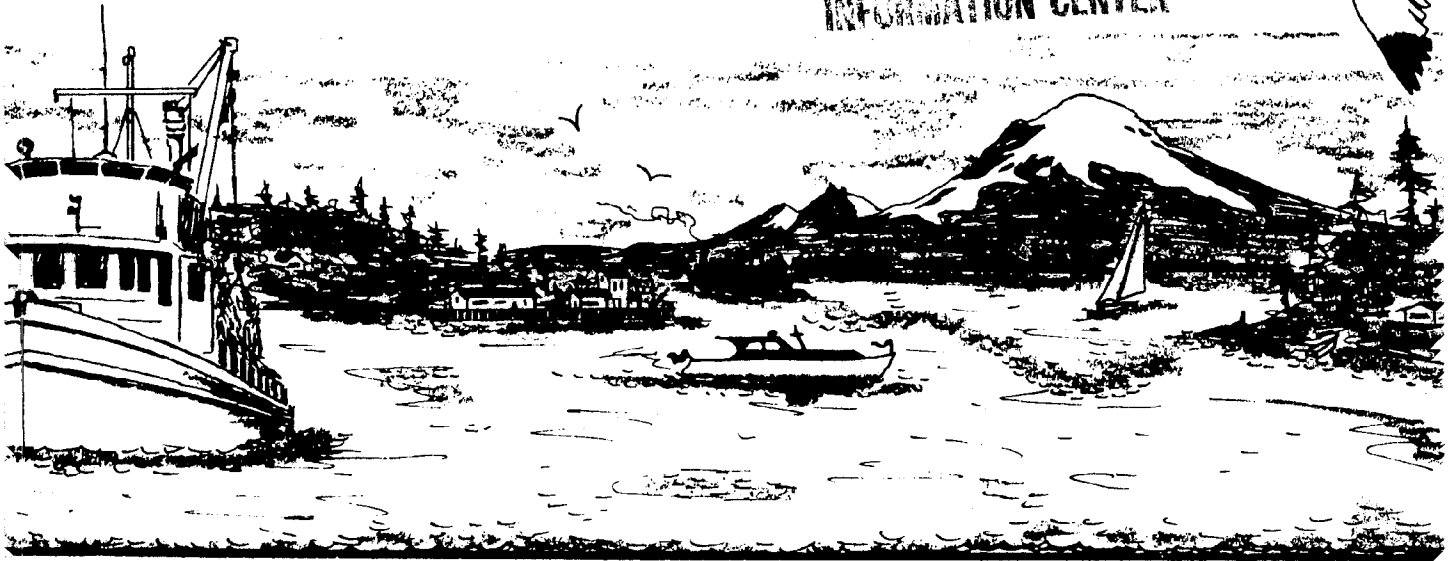


W.P.
State of
Washington
Department
Ecology
Coastal Zone
Information
Center

BASELINE STUDY PROGRAM

COASTAL ZONE
INFORMATION CENTER

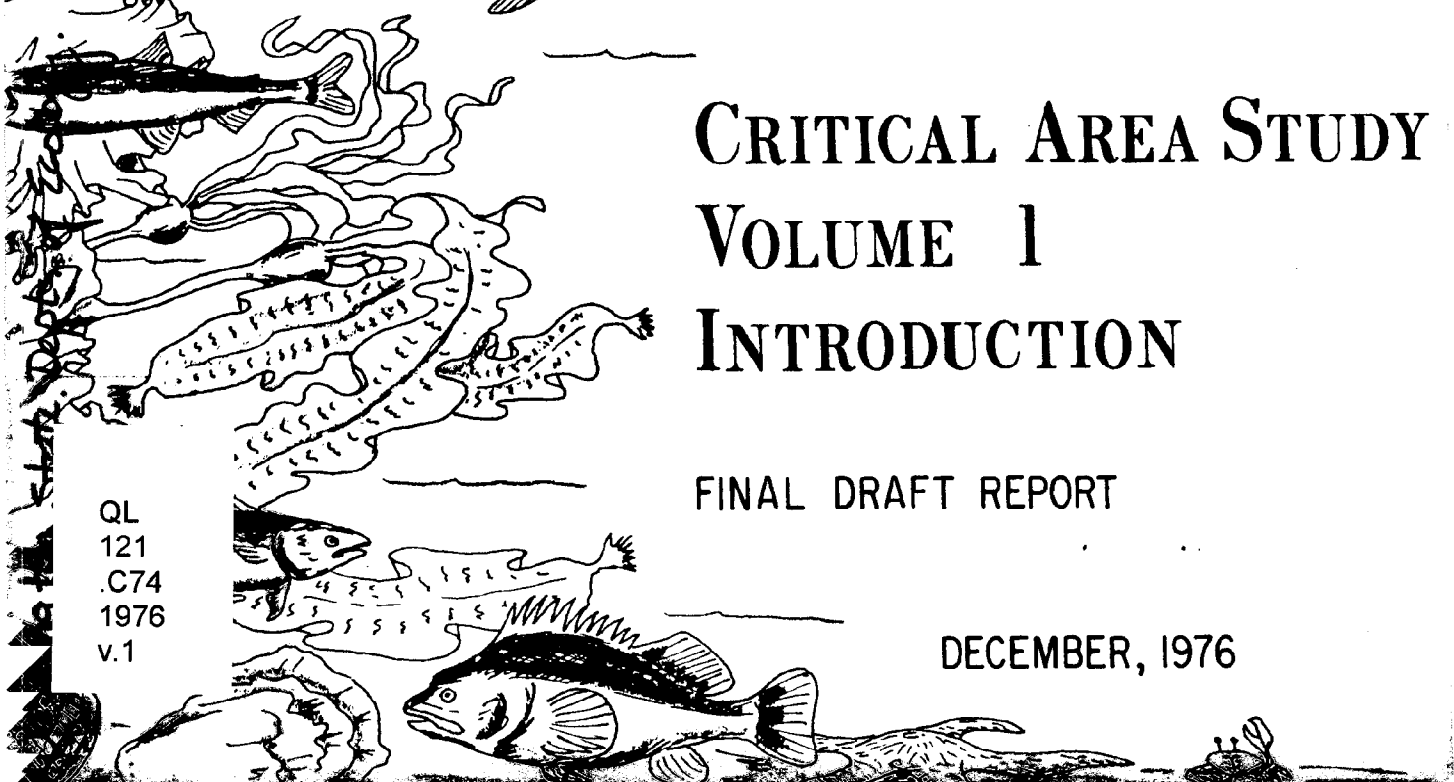


CRITICAL AREA STUDY VOLUME 1 INTRODUCTION

FINAL DRAFT REPORT

DECEMBER, 1976

QL
121
.C74
1976
v.1



STATE OF WASHINGTON
DANIEL J. EVANS, GOVERNOR

**COASTAL ZONE
INFORMATION CENTER**

CRITICAL AREA STUDY
Final Draft Report

AUG 15 1977

by

John S. Isakson
Tim A. Reichard

Mathematical Sciences Northwest, Inc.

This volume is one of the products of the Baseline Studies Program and the Coastal Zone Environmental Studies Program. It was prepared by Mathematical Sciences Northwest, Inc. under contract to the Department of Ecology. The preparation of this document was ordered by the Department of Ecology through a federal grant from the Office of Coastal Zone Management under the National Oceanic and Atmospheric Administration of the United States Department of Commerce, as authorized by the United States Coastal Zone Management Act of 1972.

This volume is published in preliminary form for review only. Subsequent publication in final form will follow as a part of the Washington Coastal Zone Atlas.

Property of CCE Library

U. S. DEPARTMENT OF COMMERCE NOAA
COASTAL SERVICES CENTER
2234 SOUTH HOBSON AVENUE
CHARLESTON, SC 29405-2413

0110100110

MSNW-P-2102

CRITICAL AREA STUDY

CONTRACT NO. 76-099

VOLUME I

INTRODUCTION

FINAL REPORT
to
WASHINGTON DEPARTMENT OF ECOLOGY

3 December 1976

John S. Isakson
Tim A. Reichard

MATHEMATICAL SCIENCES NORTHWEST, INC.
2755 Northup Way
P. O. Box 1887
Bellevue, Washington 98009

INTRODUCTION

Mathematical Sciences Northwest, Inc. (MSNW) was contracted (No. 76-099) by the Washington State Department of Ecology (DOE) on May 17, 1976 to complete a six (6) month analysis of available information to determine critical areas for 208 significant marine and estuarine species (see DOE list in Appendix A). The definitions, provided by DOE, for determining critical habitats were:

1. The area supports population of a specie(s) that not only consistently reproduces itself but because of favorable environmental conditions (currents, water temperature, salinity, etc.) provides the major source of recruitment for adjacent areas or regions whose populations do not consistently reproduce themselves.
2. The area consists of a habitat type or types that provide either shelter, food, or other environmental necessities during a critical part of a species life history. For example: nesting sites or shelter from predators during early life history stages.

There were nine habitat types defined for use in this study by DOE, these were:

Rock	Mixed Fine
Sand	Gravel, Sand, Mud
Mud	Eelgrass Bed
Mixed Coarse	Kelp Bed
Boulder, Gravel, Sand	Salt Marsh
	Open Water

In addition to the review and analysis of available data, and the assessment of critical areas for each species, the study results were used to identify data gaps and suggest specific studies for collecting the necessary data.

The reader is cautioned that the results of this study can not be considered definitive for all species and in all areas. At the outset of the study it was recognized by DOE and MSNW that this study represents the first step toward a comprehensive and definitive map of Washington's critical areas. Field studies must be undertaken to provide sufficient data to establish critical areas for certain species.

The primary MSNW staff involved in this study were:

John S. Isakson - mammals, fish, and invertebrates

James F. Kruger - matrices and text review from the point
of view of a potential user (CZM planner).

In addition, MSNW utilized the services of several consultants to provide further analysis of these significant marine and estuarine species. These consultants were:

Mr. T. A. Reichard, Wildlife Biologist, birds

Dr. A. W. Erickson, University of Washington, mammals

Mr. E. A. Best, International Pacific Halibut Commission,
marine fishes

Mr. T. R. Wahl, Ornithologist

The assessment of critical areas for birds was prepared by Mr. Reichard, consultant to MSNW.

The authors appreciate the assistance of all those persons (Appendix B) interviewed or otherwise contacted in the process of this study. The authors take full responsibility for the interpretation given all of the information received.

MATERIALS AND METHODS

The literature review analysis by MSNW began with a literature review¹ completed for DOE. Other information (DOE studies, and other studies not covered in the main literature review) and MSNW contact of researchers in the state, federal, and private sector, provided the remainder of the information evaluated. Appendix B lists these contacts by faunal group. Reference lists at the end of each faunal group volume (I Mammals, II Birds, III Fish, IV Invertebrates, see RESULTS AND DISCUSSION) present the literature review¹ and other written references used for all species fact sheets in that volume. In the case of the literature review¹, MSNW used the data as presented in the computer printout summary and did not, except in a few cases, use the original source.

In the evaluation process, MSNW initially generated fact sheets for each species that categorized the available information as follows:

LIFE HISTORY

WASHINGTON DISTRIBUTION

HABITAT REQUIREMENTS

CRITICAL HABITAT AREAS

DATA GAPS

REFERENCES

¹Beak Consultants, Inc., 1975, Biological Oil Impact Literature Review, Volumes I (191 pp) and II (464 pp) and nine computer printout appendices (3,018 pp). Prepared for Washington Department of Ecology, October.

RESULTS AND DISCUSSION

This study began with the knowledge that no species on the DOE list had been systematically censused in all Washington waters and that significant data gaps probably existed for most species life history and habitat requirements in Washington waters. This was confirmed by the available information that was analyzed.

With this background, MSNW has made an initial assessment of life history, distributional, and habitat requirements for each species in Washington and for those species with apparent critical habitat areas, a map overlay was prepared to indicate the approximate area involved.

The study results are presented in four volumes (I Mammals, II Birds, III Fish, and IV Invertebrates). NOAA charts with overlays contain the mapped critical areas located in this study.

The user of these volumes will quickly note the differences in the number of critical areas determined by faunal group. Birds by far have the largest number of critical areas, followed by marine mammals, fish, and invertebrates. This is primarily a function of the observability of birds and mammals as compared to that of the primarily underwater fish and invertebrate species. The existing information base contains more census data for the bird and mammal groups. The information base for fish and invertebrate species is in variable units ("two", "many", "present", $10/m^2$, etc.) and presents density information (primarily qualitative) for species rather than estimates of total numbers in a given part of Washington's marine and estuarine waters.

Fact sheets were prepared in the sequence of species as presented by DOE, with a letter code (i.e., "M" for mammals) and number code (i.e., "8" for the eighth species on the list). These were prepared for the lay-person's usage as much as possible.

In one case the DOE list (Appendix A) was modified and two bird subspecies for which information could not be so specifically located, were combined with another species. The double-crested cormorant (*Phalacrocorax auritus*) was used to also represent the two additional subspecies (white-crested cormorant, *P.a. cincinnatus*, northwestern double-crested cormorant, *P.a. albociliatus*) on the DOE list.

With this information, a subjective decision was then made on any critical habitat areas as defined by DOE, that were mentioned or implied by sources reviewed (both from written information and personal contacts). When critical areas were located, they were mapped on overlays of NOAA charts. MSNW selected this chart series for two basic reasons:

1. USGS quadrangles do not exist for certain portions of the study area beyond the shoreline.
2. Bathymetric information, lacking on certain USGS quadrangles, is necessary for accurate location of certain critical areas.

These areas were approximated on the map overlays in the best way possible with the information at hand. Numerous experts working on specific species were asked to review fact sheets and comment on mapped critical areas. In some cases, for some birds and mammals, the persons contacted actually drew the areas mapped.

These critical areas were then coded on map overlays for each species by its faunal group and numerical code (i.e., M-7 is the sea otter) and placed in four volumes. In the case of birds only, areas in addition to those critical habitat areas (coded B-No.) were also noted as important areas (coded B-No.). For mammals, fish and invertebrates, only critical areas (coded M-No., F-No., and I-No., were noted.

A special situation arose when T. R. Wahl, consultant to MSNW, indicated that the species-specific approach did not fully define all areas he considered critical for birds in Washington waters. MSNW therefore prepared a third bird code (No.) for multi-species critical areas. In Volume II-Birds, these multi-species areas are coded back to a Table 2, prepared by Mr. Wahl.

This "data gap" for the fish and invertebrates requires a standard unit of comparison in future studies so that relative densities can be compared and possible concentration areas noted. The density per unit area measurement for geoducks (I-34) is the type of measurement that would be useful for other sedentary invertebrate species.

Basically a great deal of additional field and laboratory information is necessary for all four faunal groups to better describe life history, distribution, habitat utilization and critical areas (if any exist) in Washington waters.

A P P E N D I X A

DOE SPECIES LIST

APPENDIX A

DOE

SPECIES LIST

MAMMALS: Open Water

Scientific Name

Common Name

Eumetopias jubata
Phoca vitulina
Callorhinus ursinus
Orcinus orca
Globicephala scammonii
Phocoena phocoena

Northern sea lion (Steller)
Harbor seal
North Pacific fur seal
Pacific killer whale
Pacific blackfish
Pacific harbor porpoise

MAMMALS: Shoreline

Endra lutris
Lutra canadensis

Sea Otter
River Otter

BIRDS: Open Water

Scientific Name

Common Name

<i>Gavia immer</i>	Common Loon
<i>Gavia arctica pacifica</i>	Pacific Arctic Loon
<i>Gavia stellata</i>	Red-Throated Loon
<i>Podiceps grisegena holbollii</i>	Holboel Red-Necked Grebe
<i>Podiceps auritus cornutus</i>	Horned Grebe
<i>Podiceps nigricollis californicus</i>	American Eared Grebe
<i>Aechmophorus occidentalis</i>	Western Grebe
<i>Phalacrocorax auritus cinnatus</i> ¹	White-Crested Cormorant
<i>Phalacrocorax auritus albociliatus</i> ¹	Northwestern Double-Crested Cormorant
<i>Phalacrocorax auritus</i> ¹	Double-Crested Cormorant
<i>Phalacrocorax penicillatus</i>	Brant's Cormorant
<i>Phalacrocorax pelagicus resplendens</i>	Baird Pelagic Cormorant
<i>Olor columbianus</i>	Whistling Swan
<i>Branta canadensis occidentalis</i>	Western Canada Goose
<i>Branta nigricans</i>	Black Brant
<i>Anser albifrons frontalis</i>	Pacific White-Fronted Goose
<i>Chen caerulescens caerulescens</i>	Lesser Snow Goose
<i>Anas platyrhynchos platyrhynchos</i>	Mallard
<i>Anas acuta</i>	Pintail
<i>Anas crecca corallinensis</i>	Green Winged Teal
<i>Anas americana</i>	American Wigeon
<i>Anas clypeata</i>	Northern Shoveler
<i>Aythya valisineria</i>	Canvasback
<i>Aythya marila neararctica</i>	Greater Scaup
<i>Aythya affinis</i>	Lesser Scaup
<i>Bucephala clangula americana</i>	Common Goldeneye
<i>Bucephala islandica</i>	Barrow's Goldeneye
<i>Bucephala albeola</i>	Bufflehead
<i>Clangula hyemalis</i>	Oldsquaw
<i>Histrionicus histrionicus</i>	Harlequin Duck
<i>Melanitta deglandi dixonii</i>	Western White-Winged Scoter
<i>Melanitta perspicillata</i>	Surf Scoter
<i>Melanitta nigra</i>	Black Scoter
<i>Mergus merganser americanus</i>	Common Merganser
<i>Mergus serrator</i>	Red Breasted Merganser
<i>Fulica americana americana</i>	American Coot
<i>Stercorarius parasiticus</i>	Parasitic Jaeger
<i>Larus galuescens</i>	Glaucous-Winged Gull
<i>Larus occidentalis occidentalis</i>	Western Gull
<i>Larus argentatus</i>	Herring Gull
<i>Larus californicus</i>	California Gull
<i>Larus delawarensis</i>	Ring-Billed Gull
<i>Larus canus</i>	Mew Gull
<i>Larus philadelphia</i>	Bonaparte's Gull
<i>Larus heermanni</i>	Heermann's Gull
<i>Larus thayeri</i>	Thayer's Gull

¹ MSNW combined these sub-species and called them Double-crested Cormorants, *Phalacrocorax auritus*.

BIRDS: Open Water (Continued)

Scientific Name

Sterna hirundo hirundo
Uria aalge californica
Cepphus columba
Brachyramphus marmoratus marmoratus
Ptychoramphus aleutica
Cerorhinca monocerata
Lunda cirrhata
Steganopus tricolor
Lobipes lobatus

Common Name

Common Tern
Common Murre
Pigeon Guillemot
Marbled Murrelet
Cassin's Auklet
Rhinoceros Auklet
Tufted Puffin
Wilson's Phalarope
Northern Phalarope

BIRDS: Shorebirds

Scientific Name

Ardea herodias farrini
Numenius phaeopus
Actitis macularia
Heteroscelus incanum
Tringa melanoleucus
Tringa flavipes
Calidris canutus rufa
Calidris melanotos
Calidris minutilla
Calidris alpina
Limodromus griseus caurinus
Limodromus scolopaceus
Calidris mauri
Calidris alba
Heamatopus bachmani
Charadrius semipalmatus
Charadrius vociferus vociferus
Pluvialis squatarola
Aphriza virgata
Arenaria interpres
Arenaria melanocephala

Common Name

Northwestern Great Blue Heron
Whimbrel
Spotted Sandpiper
Wandering Tattler
Greater Yellowlegs
Lesser Yellowlegs
American Knot
Pectoral Sandpiper
Least Sandpiper
Dunlin
Short-Billed Dowitcher
Long-Billed Dowitcher
Western Sandpiper
Sanderling
Black Oystercatcher
Semipalmated Plover
Killdeer
Black-Bellied Plover
Surfbird
Ruddy Turnstone
Black Turnstone

BIRDS: Casual Marine Feeders

Scientific Name

Megasceryle alcyon
Corvus caurinus
Haliaeetus leucocephalus
Pandion haliaetus

Common Name

Belted Kingfisher
Northwestern Crow
Bald Eagle
Osprey

FISHES: Bottom Oriented

Scientific Name

Anoplopoma fimbria
Ophiodon elongatus
Citharichthys sordidus
Atheresthes stomias
Eopsetta jordani
Glyptocephalus zachirus
Hippoglossus stenolepis
Isopsetta isolepis
Lepidopsetta bilineata
Microstomus pacificus
Parophrys vetulus
Platichthys stellatus
Pleuronichthys coenosus
Pleuronichthys decurrens
Psettichthys melanostictus
Hippoglossoides elassodon
Lyopsetta exilis
Porichthys notatus
Gadus macrocephalus
Merluccius productus
Microgadus proximus
Theragra chalcogrammus
Anarrhichthys ocellatus
Sebastes alutus
Sebastes brevispinis
Sebastes caurinus
Sebastes emphaeus
Sebastes flavidus
Sebastes malanops
Sebastes paucispinis
Sebastes ruberrimus
Sebastes pinniger

Common Name

Black cod
Lingcod
Pacific sand dab
Turbot
Petrale sole
Rex sole
Pacific halibut
Butter sole
Rock sole
Dover sole
English sole
Starry flounder
C-O sole
Curlfin sole
Sand sole
Flathead sole
Slender sole
Plain fin midshipman
Pacific cod
Pacific hake
Pacific tom cod
Walleye pollock
Wolf eel
Pacific Ocean perch
Short spine rockfish
Copper rockfish
Puget Sound rockfish
Yellowtail rockfish
Black rockfish
Bocaccio
Red snapper
Orange rockfish

FISHES: Bottom Oriented (Continued)

Scientific Name

Common Name

<i>Sebastes goodei</i>	Chili pepper rockfish
<i>Sebastes babcocki</i>	Flag (red banded) rockfish
<i>Sebastes aleutianus</i>	Rough eye
<i>Sebastes diploproa</i>	Split nose
<i>Sebastes elongatus</i>	Greenstriped rockfish
<i>Sebastes auriculatus</i>	Brown rockfish
<i>Sebastes proriger</i>	Redstripe rockfish
<i>Raja binoculata</i>	Big skate
<i>Raja rhina</i>	Long nose skate
<i>Hydrolagus colliei</i>	Rat fish
<i>Acipenser transmontanus</i>	White sturgeon
<i>Acipenser medirostris</i>	Green sturgeon

FISHES: Shoreline

Scientific Name

Common Name

<i>Salmo clarki clarki</i>	Sea run cut throat trout
<i>Hexagrammos decagrammus</i>	Kelp greenling
<i>Hexagrammos lagocephalus</i>	Rock greenling
<i>Hexagrammos stelleri</i>	White spotted greenling
<i>Enophrys bison</i>	Buffalo sculpin
<i>Hemilepidotus hemilepidotus</i>	Red irish lord
<i>Leptocottus armatus</i>	Pacific staghorn sculpin
<i>Oligocottus maculosus</i>	Tide pool sculpin
<i>Scorpaenichthys marmoratus</i>	Cabazon
<i>Amphistichus rhodoterus</i>	Redtail surf perch
<i>Brachyistius frenatus</i>	Kelp perch
<i>Cymatogaster aggregata</i>	Shiner perch
<i>Embiotoca lateralis</i>	Striped sea perch
<i>Hyperprosopon argenteum</i>	Walleye surf perch
<i>Rhacochilus vacca</i>	Pile perch
<i>Phanderodon furcatus</i>	White sea perch
<i>Apodichthys flavidus</i>	Penpoint gunnel
<i>Pholis ornata</i>	Saddleback gunnel
<i>Pholis laeta</i>	Crescent gunnel
<i>Sebastes maliger</i>	Quillback rockfish

FISHES: Open Water

Scientific Name

Alosa sapidissima
Clupea harengus pallasii
Engraulis mordax mordax
Oncorhynchus tshawytscha
Oncorhynchus kisutch
Oncorhynchus gorbuscha
Oncorhynchus nerka
Oncorhynchus keta
Oncorhynchus masu
Salmo gairdneri
Hypomesus pretiosus pretiosus
Spirinchus thaleichthys
Thaleichthys pacificus
Mallotus villosus
Cynoscion nobillis
Ammodytes hexapterus
Squalus acanthias

Common Name

American shad
Pacific herring
Northern anchovy
Chinook salmon
Coho salmon
Pink salmon
Sockeye salmon
Chum salmon
Masu salmon
Steelhead
Surf smelt
Longfin smelt
Eulachon
Capelin
White sea bass
Pacific sand lance
Spiny dogfish

ECHINODERMS: Bottom Oriented

Scientific Name

Parastichopus californicus
Strongylocentrotus droebachiensis
Strongylocentrotus franciscanus
Strongylocentrotus purpuratus

Common Name

Sea cucumber
Green urchin
Red urchin
Purple sea urchin

CRUSTACEANS: Bottom Oriented

Scientific Name

Pandalus jordani
Pandalus borealis
Pandalopsis dispar
Pandalus platyceros
Pandalus danae
Pandalus goniurus
Pandalus hypsinotus
Heptacarpus stimpsoni
Lopholithodes formaminatus
Cancer magister
Cancer productus
Lopholithodes mandtii
Pugettia gracilis

Common Name

Ocean pink shrimp
Pink shrimp
Sidestripe shrimp
Spot shrimp
Dock shrimp
Coonstripe shrimp
Coonstripe shrimp
Brokenback shrimp
Box crab
Dungeness crab
Red rock crab
Puget Sound king crab
Kelp crab

ANNELIDS

Scientific Name

Nereis verilliosa

Common Name

Pile worm

MOLLUSCS: Shoreline

Scientific Name

Mytilus edulis
Mytilus californianus
Saxidomus giganteus
Clinocardium nuttalli
Tresus nuttalli
Tresus capax
Mya arenaria
Venerupis japonica
Zirfaea pilsbryi
Siliqua patula
Protothaca staminea
Octopus hongkongensis
Octopus dofleini

Common Name

Blue mussel
California mussel
Butter clam
Common cockle
Horse clam
Big neck
Soft shell clam
Japanese little neck
Piddock
Razor clam
Rock or native little neck
Octopus
Octopus

MOLLUSCS: Bottom Oriented

Scientific Name

Octopus hongkongensis
Octopus dofleini
Haliotis rufesceans
Haliotis kamtschatkana
Panope generosa
Chlamys hastata hericia
Pecten caurinus
Hinnites multirugosus
Chlamys hindsii

Common Name

Octopus
Octopus
Red Abalone
Northern abalone
Geoduck
Pacific pink scallop
Sea scallop
Rock scallop
Hinds' scallop

MOLLUSCS: Open Water

Scientific Name

Loligo opalescens

Common Name

Pacific Coast Squid

A P P E N D I X B

MAJOR CONTACTS FOR THE CRITICAL
HABITAT AREA STUDY

List of General Contacts

<u>Name</u>	<u>Address</u>	<u>Form of Communication</u>
Director	National Marine Fisheries Service Washington, D.C.	Letter
Director	U. S. Fish and Wildlife Service Washington, D.C.	Letter
D. L. Alverson	Director Northwest Fisheries Center National Marine Fisheries Service Seattle, Washington	Letter
Paul Cook	U. S. Army Corps of Engineers Seattle, Washington	Phone
Steve Dice	U. S. Army Corps of Engineers Seattle, Washington	Letter
William Johnson	Department of Natural Resources Olympia, Washington	Letter
Jay Watson	U. S. Fish and Wildlife Service Portland, Oregon	Letter, phone
Fred Weinmann	U. S. Army Corps of Engineers Seattle, Washington	Interview

List of Mammal Contacts

<u>Name</u>	<u>Address</u>	<u>Form of Communication</u>
A. W. Erickson Consultant to MSNW	College of Fisheries University of Washington Seattle, Washington	Interview, review of reports
Steven Jefferies	Biology Department, University of Puget Sound Tacoma, Washington	Interview
Ron Hirshi	Washington Department of Game Seattle, Washington	Interview, review of reports
Gary Garrison	Washington Department of Game Olympia, Washington	Interview
Bruce Mate	Oregon State University Newport Laboratory	Phone
Howard W. Braham	National Marine Fisheries Service Marine Mammal Division Seattle, Washington	Interview
Dale Rice	National Marine Fisheries Service Marine Mammal Division Seattle, Washington	Interview, review of reports
James Estes	U. S. Fish and Wildlife Service Anchorage, Alaska	Interview, review of reports

List of Bird Contacts

<u>Name</u>	<u>Address</u>	<u>Form of Communication</u>
Grady E. Hocutt	Refuge Manager, Nisqually, Dungeness and San Juan Islands NWR P.O. Box 1756 Olympia, WA. 98507 (206)753-9467	Letter, Interview
Joe Welch	Refuge Manager, Willapa Bay NWR, Ilwaco, WA. 98624 (206)484-3482	Letter, Interview
Nevin Holmberg	Division of Ecological Services, U.S. Wildlife Service Washington, D.C. 20240 (202)343-4401	Letter, No Response 4 September 1976
Bruce Larson	Lower Columbia River NWR Longview, WA. (206)636-3360	Phone
Bureau of Land Management (State Director) (Could not read his signature)	Bureau of Land Management Oregon State and Regional Office 729 N.E. Oregon St. P.O. Box 2965 Portland, Oregon 97208	Letter, Response
National Park Service Chief Scientist	1424 Fourth Avenue Room 931 Seattle, WA. 98101 (206)442-5565	Letter, No Response 4 September 1976
Robert Jeffrey Jack Adkins Art Stendal Tracy Tivel Larry Brewer	Washington Dept. of Game 1100 E. College Way Mt. Vernon, WA. 98273 (206)424-1177	Interview and Letter
Dan Barth	Washington Department of National Resources 753-5315	Phone

List of Bird Contacts

<u>Name</u>	<u>Address</u>	<u>Form of Communication</u>
Terry Grubb	Washington Dept. of Game 509 Fairview Ave. North Seattle, WA. 98109	Letter, Phone, Interview
Jack Smith Homer Brent	Washington Dept. of Game 905 E. Heron/P.O. Box 102 Aberdeen, WA. 98520 (206)532-9680	Letter, Interview
Carroll Reick	Washington Dept. of Game 600 N. Capitol Way Olympia, WA. 98504 (206)753-5728	Letter, Phone
Don Bakker	Washington Dept. of Game 127 Oak Crest Way Pt. Angeles, WA. 98362 (206)457-5621	Letter, No Response
Michael Ryan	Washington Dept. of Game Box 116 Quilcene, WA. 98376 (206)765-3457	Letter, No Response 4 September 1976
Terry Wahl	3041 Eldridge Bellingham, WA. 98225	Interview Letters
Dr. David Manual	Dept. of Forest Resources University of Washington Seattle, WA. (206)543-1585	Phone
Dr. Gordon Alcorn	Biology Department University of Puget Sound Tacoma, Washington	Letter, No Response 4 September 1976
Bill Harrington-Tweit	1235 E. 9th Tacoma, WA. 98501	Letter, Phone
Black Hills Audubon Society	P.O. Box 2524 Olympia, WA. 98507	Letter, No Response 4 September 1976

List of Bird Contacts

<u>Name</u>	<u>Address</u>	<u>Form of Communication</u>
North Cascades Audubon Society	c/o Paul Woodcock 649 Marine Drive Bellingham, WA. 98225	Letter, Response through T. R. Wahl
Pilchuck Audubon Society	P.O. Box 1618 Everett, WA. 98201	Letter, No Response 4 September 1976
Kitsap Audubon Society	P.O. Box 961 Paulsbo, WA. 98378	Letter, No Response 4 September 1976
Olympic Peninsula Audubon Society	P.O. Box 502 Sequim, WA. 98382	Letter, Response
Rain Forest Audubon Society	c/o Bonnie Gilovich 1016 Lindstrom Aberdeen, WA.	Letter, No Response 4 September 1976
Seattle Audubon Society	2501 N.E. 57th Street Vancouver, WA. 98663	Letter, No Response 4 September 1976
Tahoma Audubon Society	4011 Alameda Ave. W. Tacoma, WA. 98466	Letter, No Response 4 September 1976
Willapa Hills Audubon Society	c/o Richard Davis 3015 Hudson Longview, WA. 98632	Letter, No Response 4 September 1976
San Juan Unit Audubon Society	c/o Charles Nash P.O. Box 93 Friday Harbor, WA. 98250	Letter, No Response 4 September 1976
Portland Audubon Society	5151 N.W. Cornell Road Portland, OR. 97210	Letter, No Response 4 September 1976
National Wildlife Federation	Louis S. Clapper 1412-16th Street N.W. Washington, D.C. 20036	Letter, Response
Natural Resources Defense Council, Inc. Johanna H. Wald	2345 Yale Street Palo Alto, CA. 94306	Letter, Response
Sierra Club	c/o Douglas Scott Sierra Club 4534 1/2 University Way N.E. Seattle, WA. 98105	Letter, No Response 4 September 1976

List of Bird Contacts

<u>Name</u>	<u>Address</u>	<u>Form of Communication</u>
Isak Walton League	1800 North Kent St. Suite 806 Arlington, VA. 22209	Letter
Pacific Northwest Seashore Alliance	P.O. Box 107 La Conner, WA. 98257 (206)259-2926	Letter, Response by Tonish Marsh
Washington Environmental Council	107 S. Main Street Room 4 Seattle, WA. 98104	Letter, Response by Fayette Krouse
Environmental Defense Fund	1525 18th St. N.W. Washington, D.C. 20036	Letter
Dr. Al Weidmann	Evergreen State College Olympia, WA. (206)866-6701	Letter, No Response 4 September 1976

List of Fish Contacts

<u>Name</u>	<u>Address</u>	<u>Form of Communication</u>
E. A. Best Consultant to MSNW	7316 - 50th N.E. Seattle, Washington	Interview, review of reports
A. Lasater	Washington Department of Fisheries Olympia, Washington	Interview, review of reports
C. A. Simenstad	Fisheries Research Institute University of Washington Seattle, Washington	Interview, review of reports
B. Miller	College of Fisheries University of Washington Seattle, Washington	Interview
Ron Arthur	Washington Department of Fisheries Aberdeen, Washington	Interview
Jim Johnston	Washington Department of Game Olympia, Washington	Interview
John Gilstrom	Washington Department of Game Olympia, Washington	Interview
Ray Johnson	Washington Department of Fisheries Olympia, Washington	Interviews
Dave Narver	Fisheries Research Board of Canada Nanaimo, British Columbia	Phone
Pat Slaney	University of British Columbia Vancouver, British Columbia	Phone, letter
Henry O. Wendler	Washington Department of Fisheries Olympia, Washington	Phone, review of reports

List of Invertebrate Contacts

<u>Name</u>	<u>Address</u>	<u>Form of Communication</u>
K. K. Chew	College of Fisheries University of Washington Seattle, Washington	Interview, review of reports
E. N. Kozloff	Department of Zoology University of Washington Seattle, Washington	Letter, review of reports
Jon Houghton	3435 E. Superior Seattle, Washington	Interview, review of reports
Herb Tegelberg	Washington Department of Fisheries Aberdeen, Washington	Interview
Douglas Magoon	Department Natural Resources Olympia, Washington	Interview
Rick Albright	Washington Department of Game Seattle, Washington	Interview, review of reports
Tom Northup	Washington Department of Fisheries Aberdeen, Washington	Interview
M. G. Mottet	College of Fisheries University of Washington Seattle, Washington	Interview
R. B. Herrmann	Weyerhaeuser Company Longview, Washington	Phone
Cedric Lindsay	Washington Department of Fisheries Olympia, Washington	Phone, review of reports
D. L. Mayer	Technicron Energy Research Associates Berkeley, California	Interview
Ron Westley	Washington Department of Fisheries Brinnon, Washington	Review of reports

DATE DUE

[illegible]

GAYLORD	No. 2333
---------	----------

PRINTED IN U S A

NOAA COASTAL SERVICES CENTER LIBRARY



3 6668 14108 1903